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How Do Firms Develop Organizational Capability to Mobilize and Create Knowledge for Innovation: Comparative Case Studies of Japanese and U.S. Firms Operating in the U.S. and Japan*

by

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How Do Firms Develop Organizational Capability to Mobilize and Create Knowledge for Innovation: Comparative Case Studies of Japanese and U.S. Firms Operating in the U.S. and Japan

Abstract

This study analyzes how Japanese and U.S. companies develop the capability to mobilize and create knowledge for innovation. The comparative case studies of Japanese and U.S. companies located in the United States and Japan reveal that companies use one of three models –organization, project team or mixed– to develop this capability. Japanese companies tend to follow the organization model, which means that they invest at the organization level in managing their employees such that the organization-level processes that support innovation are generated independent of when they are used in the process of innovation. U.S. companies located in the United States tend to use either the project team or the mixed model. Companies that follow the project team model only invest at the project level when organized for innovation by managing their employees such that similar innovation-supporting processes are generated. Companies that use the mixed model manage their personnel at both levels but do not use all the practices used by either the companies that follow the organization or the project team model. In terms of efficacy of these models, the organization model is associated with greater capability to generate innovation, followed by the mixed and the project team model.

INTRODUCTION

The capability to mobilize knowledge and create new knowledge for innovation is critical for competitive advantage, but we still do not know how to develop it. This capability has been discussed as "integrative capability" (Lawrence and Lorsch, 1967), "core competence" (Prahalad and Hamel, 1990), "combinative capability" (Kogut and Zander, 1992), and "dynamic capability" (Teece, Pisano, and Shuen, 1997), and these authors considered it as key for competition. Moreover, Japanese firms and U.S. firms that employ Japanese management styles are viewed as having superior capability (Leonard-Barton, 1992; Prahalad and Hamel, 1990; Nonaka and Takeuchi, 1995). However, despite the extensive debate about the value of firms' capability to mobilize knowledge and create new knowledge for innovation, there is still limited understanding of "how" companies develop it. As Foss, Knudsen, and Montgomery (1995) indicate: "The question of intentionality becomes particularly salient when considering how a firm sets out to build a given set of capabilities. Because resources that support a competitive advantage are by definition inimitable, and unidentifiability is a sufficient condition for inimitability, it is difficult to say how one should invest to build a competitive advantage. On the other hand, the view that one cannot make such investments purposively is not satisfactory either. Is there a way out of this conundrum?" (p. 13). Moreover, in comparison to Japanese companies, U.S. companies continue to thrive and compete.

Therefore, the overarching research question of this paper is "How do U.S. and Japanese firms develop the capability to mobilize knowledge and create new knowledge for innovation?" In answering this question, I link and integrate the theoretical approaches of the resource-based theory of the firm (Penrose, 1959; Barney, 1991), organization-level innovation literature (Lawrence and Lorsch, 1967; Nohria and Ghoshal, 1997) and team-level innovation literature (Ancona and Caldwell, 1992; Clark and Wheelwright, 1992).

I use comparative case studies of Japanese and U.S. companies located in Japan and the United States to answer the research question. The analysis of multiple comparative case studies enables the development of an empirically grounded theory and propositions on how companies develop this capability.

The analyses reveal that companies use one of three models –organization, project team or mixed– to develop the same capability. Japanese companies tend to follow the organization model, which means that they invest at the organization level in managing their employees such that the organization-level processes that support innovation are generated independent of when they are used in the process of innovation. U.S. companies located in the United States tend to use either the project team or the mixed model. Companies that follow the project team model invest at the project level in managing their employees only as needed in the process of innovation. Companies that use the mixed model manage their personnel at both levels but do not use all the practices used by either the companies that follow the organization or the project team model.

The rest of the paper is organized as follows. Section 2 presents the theoretical background. Section 3 provides the research design. Section 4 presents results of the case studies and the proposition developed. Section 5 concludes.

THEORETICAL BACKGROUND

The resource-based theory of the firm can be expanded by linking it to both the organization-level innovation literature and the team-level innovation literature to provide a better understanding on the process of developing the capability to mobilize and create knowledge for innovation. Capability in the resource-based view has been stimulated by the study of Japanese firms, and within the resource-based view, there are two camps that study this capability: one emphasizes knowledge mobilization and the other knowledge creation. Researchers who emphasize the mobilization process tend to assume creation occurs and only discuss the factors that facilitate knowledge mobilization, particularly cooperation and communication patterns (Prahalad and Hamel, 1990; Kogut and Zander, 1992). However, they do not explain specifically how these factors are developed. Prahalad and Hamel (1990) suggest that firms that have core competencies manage their employees such that there is a shared sense of cooperation in achieving organizational goals and communication patterns that transcend functional and business boundaries. They view firms that have core competencies as firms that induce their employees to share or mobilize knowledge and expertise across boundaries to generate innovations. Firms that lack core

competencies view each part of the organization as rivals, and therefore, limits knowledge mobilization by hiding critical knowledge from each other rather than sharing it to create new resources. Kogut and Zander (1992) suggest that the "organizing principles" facilitate the development of this capability by facilitating communication and cooperation. However, it is unclear what these organizing principles are in developing this capability.

Researchers who emphasize the creation process (Nonaka and Takeuchi, 1995; Leonard-Barton, 1995) view individuals as boundedly rational, and therefore, even if the motivation problem for knowledge mobilization is solved, knowledge that is being mobilized does not lead to new knowledge creation. Since individuals are boundedly rational, they face the problems of absorbing and converting knowledge that is being shared and convert it into organizational knowledge because of knowledge specialization in organization (e.g., Nonaka and Takeuchi, 1995). This limitation is solved by having individuals with the absorptive capacity for different types of knowledge that is being shared. Therefore, in developing this capability, for mobilization, organization design or management practices that motivate knowledge sharing are critical (Lawrence and Lorsch, 1967; Nohria and Ghoshal, 1997), and the conversion process requires overlapping knowledge (e.g., Nonaka and Takeuchi, 1995; Leonard-Barton, 1995).

Perspectives from the organization-level innovation literature

The organization-level innovation literature suggest that knowledge mobilization is facilitated by a set of integrative mechanisms, which are related to how employees are managed (Lawrence and Lorsch, 1967). These practices are designed to facilitate cross-functional communication and the building of shared sense of commitment and cooperation in achieving organizational goals. The integrative mechanisms include the use of incentive practices whereby individuals are designated as integrators and are rewarded for this role. Another facilitating factor is job design that is based on team concepts e.g. taskforces (Galbraith, 1977) whereby individuals are assigned to work on projects rather than individually designed tasks. Moreover, individuals are rewarded for the behavior of knowledge sharing (Aoki, 1988), or they are socialized across different functions (Nohria and Ghoshal, 1997) such that they build social ties across functions that facilitates cross-functional communication frequency.

Perspectives from the team-level innovation literature

Moreover, the stream of literature on innovation that focuses on the project team-level of analysis, which specifically deals with when organizations organized their employees into project teams for innovation, similar to the organizational capability and organization-level innovation literatures, suggests that team-level processes such as communication frequency and the shared sense of commitment and cooperation among team members are critical for knowledge mobilization. These team-level processes are facilitated by a set of project team management practices such as team development (Roth and Kleiner, 1996) and reward for team performance (Ancona and Caldwell, 1999).

Other literature on innovation explains the practices that facilitate the process of creating new knowledge for innovation. This stream of literature suggests that the processes of knowledge creation require overlapping knowledge among individuals involved in the creation process (Nonaka and Takeuchi, 1995; Leonard-Barton, 1995). Therefore, this capability requires the development of personnel such that they have overlapping knowledge in different disciplines. Moreover, since effective resources creation, i.e., product innovation also requires deep disciplinary expertise and knowledge and some degree of diversity among them, only some employees acquire overlapping disciplinary knowledge. Since employees in organization have different knowledge sets, when organized into project teams for mobilizing and creating new knowledge, membership selection, based in part, on overlapping knowledge is important (Nonaka and Takeuchi, 1995: 77).

Therefore, after integrating the threes streams of literature —the capabilities approach within the resource-based theory of the firm, the organization-level innovation literature, and the team-level innovation literature— the question of how to invest in developing this capability is not answered. Do organizations invest at the organization level independent of when they organize their employees for innovation or at the project level when organized for innovation? This puzzle and limitation lead to the undertaking of the case studies to analyze how companies, especially those located in Japan and in the United States, develop this capability.

RESEARCH DESIGN

The case studies consist of the analysis of the factors and practices used to develop this capability in 24 cross-functional innovation teams of three companies. Initially, I analyzed 18 companies, 10 Japanese companies located in Japan and eight U.S. companies located in the United States. The three companies I analyzed in depth were selected on the basis of achieving maximum divergence in the practices and factors, the independent variables, rather than on this capability, the dependent variable. The one Japanese company selected is representative of the other nine companies analyzed while the two U.S. companies are also representative of the other seven U.S. companies. For each of the three companies analyzed, eight randomly selected cross-functional innovation teams were selected for analysis.

Data were collected from three manufacturing plants, one located in the Northeastern United States (Alpha), one in the Midwestern United States (Sigma), and another in a suburb of Tokyo, Japan (Beta). Each plant houses more than 500 employees, with design, manufacturing, production, and sales/customer services in one location. These plants also have project teams working on process and product innovations involving each of these functions.

Data were collected following the case study data collection protocol (Yin, 1984). I used five different collection methods: trade journals, company archival records, interviews, direct observation, and a short questionnaire. Before visiting the companies for the purpose of making observations and conducting interviews, I analyzed each company using annual reports, company-supplied archival data, and secondary sources of information such as trade journals.

Constructs and Variables

This study focuses on variables related to five main constructs: outcome of the capability, project team-level processes, project team-level human resource management practices, organization-level processes, and organization-level human resource management practices. The selected variables are analyzed either because previous literature indicates they are relevant for developing this capability, or because interviews and direct observation indicate they influence the development of this capability.

Capability to mobilize knowledge and create new knowledge for innovation. The construct capability is represented by its outcome (Godfrey and Hill, 1995), in this case, the number of innovations each organization generated through its project teams that were selected for the study. For Alpha, six out of the eight teams came up with an innovation; therefore, as an organization, it has six innovations. For Beta, all teams came up with an innovation; therefore, it has eight innovations. Sigma has only five innovations, since only five out of the eight teams created new knowledge for innovation.

Innovations in this study are related to both products and processes. In Alpha, examples of the innovations generated by the project teams are the redesign of manufacturing processes to improve quality of cameras, which is one of its core products, minimizing down time of assembling cameras, and improving yield in camera production. For Beta, examples of the innovations created by the project teams are the reconfiguration of components of heavyweight construction machines to be launched in the US market, the redesign of plowing machines for the Swedish market, and the redesign of medium-size construction machines with the latest technology licensed from a Swedish company. For Sigma, some of the innovations include the redesign of alternators for the latest model of the sport utility vehicles (SUVs), and redesign of fuel pumps intended for markets with extreme heat (e.g., Saudi Arabia and Southeast Asia).

Project team-level human resource management practices. Project team-level human resource management practices are also divided into two groups, practices that facilitate knowledge mobilization and practices that facilitate knowledge creation. The facilitators of knowledge mobilization are: (1) Project team development (Thamhain and Wilemon, 1997), which is the training the company provides to teams for performing a particular project. (2) Project team reward (Wageman and Baker, 1997) either for individual performance on team, or team performance, or both, in terms of salary increases, bonus, job assignment, and promotion. The practice that facilitates knowledge creation is project team membership selection (Nonaka and Takeuchi, 1995). The measures for this variable are the specific criteria project teams used in forming their teams.

Organization-level human resource management practices. The organization-level human resource management practices analyzed in this study are based not only on previous research but also on interviews

I conducted and on my first-hand observations of the companies. The organization-level human resource management practices are divided into two groups, practices that facilitate knowledge mobilization and practices that facilitate knowledge creation. The facilitators of knowledge mobilization are: (1) Selection (Ichinowski et al., 1997). Measures for this practice are coded from evaluation forms used by recruiters of these companies. (2) For reward, the measures are obtained from the company's performance evaluation forms and discussions with personnel managers about which factors are critical in determining salary increase, promotion, and the award and amount of bonus payment. (3) For the control on individual reward (Katz and Allen, 1985), I conducted interviews concerning the topic of managerial responsibility for control over individual reward (i.e., functional manager, project manager, human resource manager, and peers). For (4) orientation (Nohria and Ghoshal, 1997), I interviewed personnel managers about the introductory steps that new employees take upon their arrival in the organization. (5) For work patterns, I observed and interviewed department managers on how daily tasks were performed in the R&D, sales/marketing, and customer service functions. The facilitator of knowledge creation is cross-functional development (Nonaka and Takeuchi, 1995; Leonard-Barton, 1995). I asked personnel managers to explain step-by-step the development processes of professional employees, particularly engineers, sales/marketing and production personnel, from the time of entry to retirement (Westney and Sakakibara, 1986).

Method of Analysis

I analyzed the data by first building individual case studies. For each project, I used a combination of the "fishbone method" and flow chart documenting the factors by which knowledge is created and transformed into an innovation. I then compared across cases within and across companies to construct a conceptual framework (Eisenhardt, 1989). The analysis proceeded as follows: First, I entered all responses into a database indexed by company, project team for each company, interview questions by their number, and then question number from the questionnaires. Second, I constructed a single version of both the organization and team-level interviews for each case by collecting all responses to the same question together as a single response. Using the interviews, answers to the questionnaires, and secondary sources, I wrote a case study for each project, then for each organization.

RESULTS

This section presents the results of the comparative case study and derives proposition organized by level of analysis. I discuss the project team-level processes and the project team-level human resource management practices in facilitating this capability. I then discuss the ways in which the organization-level processes and organization-level human resource management practices support this capability directly and indirectly by impacting these project team-level processes. The framework that emerges from the study is depicted in Figure 1.

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Insert Figure 1 about here
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Project team-level processes and the capability to mobilize and create knowledge for innovation

Internal communication frequency. Overall, Beta seemed to experience the highest frequency of internal communication, followed by Alpha and Sigma. For Beta, teams that succeeded met as frequently as necessary to accomplish this task. For Alpha, the teams that succeeded met as frequently as they thought necessary. However, they attribute their meeting frequency to the help of the "team facilitators," or trainers, who set the timetable for team meetings. All teams reported some friction between different functions presented on the team, especially between design and manufacturing. Manufacturing team members were less willing to meet than members from other functions. However, the facilitators helped resolve conflicts that arose between team members from the different functions. These facilitators reported to the corporate function, and their main responsibility was to teach cross-functional team members "how to get along" in order to share knowledge in completing the project. As a team member suggested: "We met frequently because our facilitators helped us set the agenda where we have to meet once every two weeks."

For Beta, all teams met as frequently as necessary. Teams viewed meetings to share knowledge and information as natural activities that were necessary to accomplish their task. Teams frequently met after work and on their own personal time, such as during lunch and coffee breaks, to work on their projects. Some teams even met on weekends, outside their daily work environment, to work on their projects.

Without any external influence or pressure for teams to meet, a team leader working on a redesign of a heavyweight construction equipment for the U.S. market stated, "We met as frequently as needed, maybe once every two weeks."

At Sigma, project teams that succeeded in creating knowledge for innovation also met more frequently than those that did not succeed. Teams that did not generate any innovation met less frequently than teams that succeeded, and when they did meet, not all team members attended the meetings. In fact, some team members never showed up at all. A representative quotation for team internal communication in Sigma came from a team leader working on a redesign of an alternator for an SUV: "We met once every two months. Until management got involved and they brought in the consultants who forced us to meet periodically by setting up the agenda for us to meet. Even then, some team members never showed up at all."

External communication frequency. Overall, external communication frequency of project teams seemed to be highest in Beta, followed by Alpha and Sigma. For Alpha, external communication occurred both between team members and their colleagues within the same function, and when team members who had contacts in different functions communicated with these contacts to search for the necessary resources and support for the project. Some team members working to improve yield talked not only to other managers who were in charge of production of different products but similar production processes, but also to design engineers, in an effort to better understand production specifications. As a team leader who has worked in design, manufacturing, and who is currently working in customer services, stated: "I personally like to talk to people outside the team and outside my functional area, because they [people outside the function] are less of a threat[1]."

For Beta, each team member was active in searching for the necessary resources external to the team, both inside and outside their functional areas. When team members perceived the need for knowledge and expertise in functions other than those represented on the team, they turned to their

[1] The explanation here is that, although project managers have some influence on individual rewards, particularly promotion and job assignment, the functional managers hold most of the control. Therefore, if "word gets around"

networks in different functions to find the necessary resources. In the case of a project team working on the redesign of a mid-size plowing machine, the design engineers not only turned to other experts in their functions, but also to the field technicians, sales/marketing personnel, and sales representatives in that market, allowing them to better understand customer preferences. As one team member indicated: "We talked to people in our own functions as well as outside as needed."

For Sigma, external communication within the same function was actually higher than internal communication frequency, because team members preferred talking to their colleagues in the same function to talking with people whom they did not know from different functions, which are represented on the team. External communication in Sigma differed from Alpha in that external communication was confined to the same function, with almost no external communication across different functions. The following quotation, which came from an engineer, is representative of this: "It seems that people from each function talk to other people in their functions more frequently than others on the team. We meet with the rest of the team when we absolutely need to."

Shared sense of cooperation. Overall, Beta seemed to have the highest level of shared sense of cross-functional cooperation, followed by Alpha and Sigma. For Alpha, project teams that succeeded also had some sense of shared commitment and a common goal in achieving the innovation. Moreover, they understood who would contribute what in accomplishing their team task. Teams that did not succeed viewed their teams as fragmented. Some members teamed up with other members from the same functional areas. In the case of a team working on process improvement of camera production, team members from manufacturing teamed up to fight off the demands from members in design and sales/marketing over the changes they had to make to their production processes. Another team that was unable to generate an innovation also faced tremendous friction between team members from R&D and from manufacturing engineering. Despite the representation of other functions, team members representing R&D and manufacturing engineering formed two dominant coalitions, each with its own agenda. Since the infighting could not be resolved between these coalitions, even when the facilitators and top management

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about the performance of the project in the functional department where there is already competition for promotion.

were involved, the project was delayed and eventually terminated. The following quotation, which came from a team leader working on a process improvement project, is representative of this:

> Manufacturing gets the most defensive. Whenever we ask for additional information from there, they usually make remarks about how we want to destroy their organization. Ed [the trainer] and his assistant from corporate helped us organize the work processes and dealt with any conflicts that came up between manufacturing and everyone else.

For Beta, each team felt some sense of shared commitment and the obligation to other team members to complete the project. Moreover for two reasons, all teams gave their loyalty and commitment to the company and not to the function they currently represented. First, they had worked in different functions and could therefore understand what members of the teams from different functions required of them in order to accomplish the project. Second, since employees were rotated to different functions throughout their careers, R&D engineers would not form coalitions to fight manufacturing engineers, as they would eventually be rotated to work in manufacturing as part of their career path, if this had not already occurred. Likewise, the manufacturing engineers did not want conflict with the R&D engineers, because R&D might also be their next rotation. Therefore, all project teams in Beta had some sense of shared commitment and a common goal in accomplishing the task, a cohesive view that went beyond the objective of their individual functional department.

For Sigma, the opposite group dynamic occurred. All project teams experienced some infighting. However, on three project teams, infighting and a lack of commitment led to the termination of the projects. Members from each function expected the worst from one another, and brought with them their own agenda and cultural elements that were distinct from each other and, in some cases, incompatible. There was a history of resentment between manufacturing engineers and finance. Manufacturing engineers resented the fact that their projects had to be approved by the finance department, who, in their opinion, did not possess the technical knowledge that would enable them to assess accurately the cost and value of the projects. Members of the finance department resented members of manufacturing engineering, who had historically underestimated the project costs and overestimated their benefits in order to get project

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that could affect team members' opportunities within their departments.

approval, and then requested more money after the approved amount had been spent. The lack of a shared goal and commitment in accomplishing the project led to project delay and eventual termination. The teams that succeeded attributed their success in part to the intervention by the "trainers," or facilitators, who helped them to communicate better and organize their work processes. One team member described the relationship between members of different functions on his team in the following way:

> Very charged between the engineers and the finance people. Finance controls the money and the engineers make things. They don't get along. If you bring the production people into the picture, it is an even bigger mess. They trust neither of these guys. When the consultants got involved, they taught us how to talk to each other; build trust and remove some of the assumptions we have about each other.

Cross-functional overlapping knowledge. Overall, Beta had the highest cross-functional overlapping knowledge, followed by Alpha and Sigma. For Alpha, team leaders who possessed the overlapping knowledge in design and manufacturing were able to convince managers in these functions to support their projects by explaining in the words of these organizations how the innovation would help rather than hurt their organizations. Cross-functional overlapping knowledge seemed to be a function of length of company tenure. The team leaders of projects that succeeded had been with the companies for 20 to 25 years. For example, the team leader that worked on designing miniature cameras for the children's market has some work experience in manufacturing, R&D, and customer services. As one customer service manager stated: "If you look hard enough, you'll find people who have worked in different disciplines, especially the old-timers." In the two teams that did not succeed in creating new knowledge for innovation, the team leaders had no work experience in functions outside the ones they represented, and their tenure with the company was only from one to five years.

In Beta, all project teams had members who possessed some overlapping knowledge. All project team leaders tended to have the longest tenure with the company and had also gained overlapping knowledge. As a team leader suggests: "Out of six people on our team, three people have worked in each other's functions." This knowledge of different functions enabled them to comprehend and use the different types of knowledge being shared by different members. Moreover, when misunderstandings

occurred between members who lacked overlapping knowledge, the team leaders intervened to bridge their differences.

For Sigma, none of the project teams possessed overlapping knowledge. As a team member indicated: "There was none (of overlapping work experience) on our team. The consultants tried to establish a new language for us to use." All teams suggested that the difficulty in understanding the knowledge being shared on the team occurred because members from each function brought with them their own "jargon" and some elements of their own inside jokes, as well as sarcasm. Since there was no one on the team who could bridge the differences in the types of knowledge being shared, in two cases, team members decided to spend some time in one another's workstations to try to understand better what each member was attempting to share.

Project team-level human resource management practices and the capability

Project team development. Project teams in Alpha and Sigma attributed their performance to project team-level human resource management practices, particularly project team development, whereby team members were taught how to organize their work processes, such as setting the agenda to perform certain project tasks and deciding upon how frequently to meet. Moreover, trainers taught them how to communicate better with team members from different functions. The presence of the trainers as "facilitators" throughout the life of the project also helped minimize conflicts and enhanced members' ability to share knowledge and information. For project teams working on innovation projects, Sigma often hired external "consultants" to train and facilitate knowledge sharing, whereas Alpha instituted the project team development program into the corporate function. For Beta, the team leader organized the work processes and set the agenda from meetings as agreed by the team. No additional "trainers/facilitators" participated on the team.

Project team reward. Alpha and Sigma also rewarded members for project team participation. Alpha rewarded project team performance by providing team members with favorable job assignment and promotion after the project had been successfully completed. Sigma provided monetary rewards, favorable job assignments and greater opportunity for promotion. These practices turned out to be motivating factors

in project team performance and therefore innovation. However, the practices were not institutionalized as part of the larger human resource management system, as they were ad hoc in most project teams. In Alpha, team members may have received different types of rewards. Some core team members may have received a favorable job assignment, while others received a promotion. In Sigma some members may have received a bonus payment, while others received a favorable job assignment or promotion. In Beta, members of project teams did not receive any reward for their participation on project teams.

Project team membership selection. In Alpha and Sigma, the top management team of the organization, consisting of the plant and functional managers, usually selected the project teams. Team membership selection in Alpha was strongly based on cross-functional knowledge, particularly on job experience in different functions and possession of expertise needed for the task. For Sigma, managers selected members they perceived to have the most suitable expertise. For Beta, team members self-selected, often based on social networks and the fit between task and expertise.

Project team-level human resource management practices and project team-level processes

Project team-level development, team internal communication, and shared sense of cooperation. Team training on how to communicate better with people from different functions, how to set the agenda for meetings, or how to resolve conflicts, affected communication frequency on project teams as indicated by some team members in Alpha and Sigma. Additionally, project team development involving trust building helped build a shared "sense of cross-functional cooperation," particularly shared commitment and goals in accomplishing the project, as well as the understanding of who would contribute what in accomplishing the task.

Project team-level reward, team-internal, and team-external communication. Reward for project team performance also facilitates knowledge sharing. In Alpha and Sigma, some team members suggested that before teams were recognized for their participation on these projects through monetary compensation, promotion, or favorable job assignment, meetings were even less frequent despite the facilitators' insistence on meeting. A representative quotation came from a team member in Sigma: "It used to be much worse when we weren't being recognized for this [work] that we're forced to do. There were people whose

names were on the list as part of the team but never showed up to any of the meetings." A team leader in Alpha also suggested: "I would be lying if I say that I didn't know that I might get a promotion out of doing a good job on the last project."

Project team-level membership selection and team overlapping knowledge. In the case of Alpha, where only certain employees were assigned cross-functional job rotation, and in the case of Sigma, where cross-functional job rotation was not assigned, careful selection ensured some overlapping knowledge. In both of these companies, project membership selection was based in part on this factor. Beta relied on the relationship between tenure and overlapping knowledge. Therefore, if the team leaders and core team members had sufficient tenure, they expected there would be some overlapping knowledge on the team.

Organization-level processes and the capability to mobilize and create knowledge for innovation

Cross-functional communication frequency. Of the three organizations, Beta most frequently demonstrated that cross-functional communication was integral to the daily context of the organization, followed by Alpha and Sigma. Alpha seemed to have some cross-functional communication embedded in their daily routines. However, this communication seemed to be formal and occurred mainly among managers who met to discuss work-related issues pertaining to the organization. Cross-functional communication among non-management employees was even less frequent, unless they were working on a cross-functional team. Cross-functional informal communication, communication that was not required by their jobs, was very infrequent. Employees segregated themselves by functions, not only in performing their daily tasks, but also informally in their social interactions. As one personnel manager stated: "We don't talk much to people outside of our functional area. If you come to the cafeteria, you'll see the engineering clique, production, HR, etc. I don't know what it is, but I think it is our professional pride that prevents us from talking to each other."

Beta seemed to have higher cross-functional communication frequency than Alpha. Cross-functional communication occurred among employees in both the management and non-management ranks. While employees in the management ranks communicated cross-functionally about work-related issues, among employees in the non-management ranks, cross-functional communication was informal, and

did not pertain to work-related issues. The non-management employees communicated with their social counterparts in different functions while on the job, requested knowledge and information to perform daily tasks, and met during personal time such as coffee breaks, as well as after work for social activities. These social ties were formed during the initial orientation, when all new employees, regardless of function, were exposed to each other. The ties were reinforced during cross-functional on-the-job training and job rotation, and were maintained through cross-functional social communication.

Sigma seemed to have the least cross-functional communication, which occurred mainly among employees in the management ranks, and was limited to work-related issues. Cross-functional communication frequency among non-management employees was lower than that of either Alpha or Beta. Similar to the case of Alpha, Sigma's lack of communication can be attributed to two factors. First, non-management employees did not see the need for communication outside their functional areas, as their daily tasks did not require it. Second, most employees only formed social ties within the same function. In other words, job performance did not demand communication across functions.

Shared sense of cooperation. Overall, Beta demonstrated the highest level of shared sense of cross-functional cooperation, followed by Alpha and Sigma. Within Alpha there was some friction between individuals from different functions, particularly designs and manufacturing. Moreover, individuals accorded different levels of prestige to different functions. There appeared to be some sense of commitment and shared goals, although different functions also had their own agendas, and their ultimate loyalty remained with the goal of the functional department. In summary, Alpha seems to have the fiefdom mentality, whereby different parts perceive each other as coalitions of interest rather than collectively as a cooperative system, as one engineering manager in production indicated:

> We operate like a fiefdom. The engineers have more respect than anyone else. If you're an engineer, you have an edge here. And their mindset is still that of 'if we build it they will come'[2]. Therefore, they don't listen to the sales/marketing people to get ideas about what customers want. Moreover, I have been here nearly 30 years and I never knew what is cooking in R&D. Now they say they are putting posters up outside their office doors to share with people about what they are doing, let's go and look.

Individuals in Beta felt a stronger sense of shared commitment in achieving the organizational goal, rather than the goal of their department. In fact, commitment to the functional department was lower, as they viewed each function in which they worked as a temporary stop on their career development path. They viewed different parts of the organization as part of the larger system that needed to work as a whole in order to achieve the organization's goal. Moreover, since they had been exposed to various functions, they had a better understanding of how the different parts of the organization fit together and had to work together as a system. They saw the value of shared commitment and how knowledge embedded in different parts of the organization could be shared to accomplish certain tasks. Essentially, individuals from different parts of the organization appear to have a cooperative system mentality about their organization. The following quotation, which came from an engineering manager whose current position was to train/socialize engineers into the company, is representative of this:

> Like other large prestigious Japanese companies, we only hire the best engineers, and of course, initially, they all think that they are hot shots because they are from Tokyo University etc. In order to break the mentality that only they matter, we force them to see what other people do in other parts of the company and how valuable these other people are in relation to what they have to do. After making them sweep floors, work on assembly lines, side-by-side with the real production workers and customer service representatives answering calls from customers, and yes, all the hours that these workers put in, they become more humble, respectful, and cooperative with people from other parts of the organization.

Sigma lacked the organization-shared sense of cross-functional cooperation. The sense of shared commitment in achieving organizational goals seemed to be lower than that of Beta or Alpha. Different functions viewed each other as separate coalitions of interest rather than as parts of a larger system with a coherent goal benefiting all functions. Their sense of commitment was toward their functional departments and, since they expected to stay within the same function throughout their careers, their loyalty and commitment remained with their functional department rather than the organization as a whole. In summary, Sigma is a silo organization that has a "coalitions of interest" mentality, and therefore

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[2] This is in reference to the movie "Field of Dreams".

demonstrates a lack of cooperation with other people outside their functional areas, as one engineer indicates:

> We are definitely a silo organization not only in how we do things, but also in our mindset. Each function has its own agenda and thinks that each is better than the others. People in some functions are more paranoid than other people in different functional areas about being sabotaged by outsiders. Others discourage their people from making friends with people from outside their areas to preserve their credibility and conflict of interest.

Overlapping knowledge. Alpha exhibited some overlapping knowledge embedded in the larger context of the organization. It provided job rotation of engineers between R&D and manufacturing, and thus established some overlapping knowledge between these functions. However, Alpha's level of overlapping knowledge was lower than that of Beta, which provided cross-functional-job rotation and on-the-job training to a wider range of their professional employees than just engineers. As an HR manager stated: "Engineers do receive training in other functional areas, but usually voluntarily. Now we are trying to systematize it, but it is not easy. The departments receiving them resist the idea of having to develop people who will be there only temporarily. Most managers do not see the value of this program yet." Sigma had the lowest level of overlapping knowledge, as it did not provide any cross-functional job rotation or on-the-job training to any employees.

Organization-level human resource management practices and the capability

Selection. Alpha not only recruited employees based on their potential individual performance, as measured by their academic performance and school reputation, but also based on behavioral factors, particularly their "ability to work" in a team and the "willingness to cooperate." Beta only recruited candidates from targeted schools and used personality tests to determine employee personality traits that are conducive to a teamwork environment. Sigma, on the other hand, recruited employees based solely on their potential individual performance, as measured by school reputation and academic performance.

Reward and control on individual reward. Alpha and Beta rewarded individual performance and behavioral factors, particularly cooperation, and the sharing of knowledge and information. For Beta, these behavioral factors affected salary increases, the award of bonus payments and their size, and promotion,

while for Alpha they affected job assignment and promotion. Sigma, on the other hand, rewarded only individual performance, particularly the quality and quantity of work performed. Alpha and Beta also divided the control of the system determining individual rewards among different managers. For Alpha, both the functional and project managers had control over the system determining individual rewards. Although most of the power to award salary increases was given to the functional manager, project managers had some influence over promotion and job assignment. For Beta, the influence determining the assignment of individual rewards was divided between the functional and the personnel managers. Although the functional managers had more influence, personnel managers made the final decisions on the overall performance evaluation of an individual. Personnel managers also made the final decision about individual salary increases, job assignment, bonus payment and promotion. In Sigma, functional managers had all the power to assign individual rewards.

Work patterns. Work patterns in Alpha were similar to Sigma in that the daily task was clearly defined for each individual. However, Alpha had been trying to encourage process and product innovation by encouraging cross-functional team participation such as quality circles. In Beta, when new employees first arrived in a given department, they were not assigned a task to perform alone. Instead, an older employee with around five years of experience was assigned to work with the new employee. The older employee was expected to train the new employee and work together to accomplish the task. Since the older employee had to train the younger employee and accomplish the task at the same time, other employees were also assigned to help the mentor, so that this employee would not be slowed down. This work pattern was common in the engineering, sales/marketing and finance departments. These practices also supported innovation, since they encouraged knowledge and information sharing. Moreover, from the beginning, employees belonged to some type of quality circle that was based on cross-functional teams.

Orientation, training, and development. For orientation, Alpha and Sigma did not provide cross-functional orientation to their new employees. Beta, on the other hand, employed this practice with all new employees, regardless of the functions in which they would be placed. For cross-functional on-the-job training and development, both Alpha and Beta employed these practices. Alpha limited its cross-

functional on-the-job training and development only to the engineers. Typically, engineers spent some time in manufacturing and R&D and then some time in customer services dealing with the customer-product interaction. At the same time, they were given off-the-job training on cost analysis and other issues dealing with business that were outside of engineering. In Beta, after two months of training in the manufacturing organization, new employees were divided into different groups for more specialized training, such as advanced topics in engineering for engineers and other highly specialized fields for other groups of employees. They were then trained in sales management and customer services for another two months. During this training, regardless of whether they were to be placed in engineering or finance, new employees worked with other sales people dealing directly with the customers. This was emphasized most strongly for engineers who were to be placed in product design and manufacturing. After the first year of on-the-job training, new employees were once again assembled at the headquarters for two days to discuss what they had learned and the kind of problems they had faced. Moreover, throughout their careers, they were rotated to different functions for career development. Sigma provided extensive function-specific orientation and training but did not provide any cross-functional training and development.

Organization-level human resource management practices and organization-level processes

Cross-functional communication frequency. In Alpha, employees who had job experience in different functions had been able to form social networks that encouraged communication, especially as needed to perform daily tasks or when working on project teams. However, since Alpha provided cross-functional training and development only to its engineers, its cross-functional frequency seemed to be lower than that of Beta. Beta exposed employees from the beginning to different functions of the organization. This exposure also enabled them to form social ties that facilitated communication across functions. Moreover, since Beta also provided cross-functional training and development not only to its engineers but also to all its professional employees, there appeared to be more social ties across functions, encouraging communication not only for work purposes but also for social activities. Sigma, which did not provide any cross-functional orientation or development, had employees with few to no social ties across

functions. Since daily tasks were individually defined, there was no need to communicate cross-functionally for professional or social reasons.

Organization-shared sense of cooperation. Beta, which provided cross-functional orientation, training and development, had a higher level of shared sense of cross-functional cooperation. The exposure they received enabled them to see how different parts of the organization were connected in maintaining daily operation. Moreover, the sense of commitment and loyalty was given to the overall organizational goal, rather than the departmental goal, since they viewed themselves as working for the company rather than for any one functional department. Alpha and Sigma, on the other hand, did not have these practices, and viewed the organization as more fragmented. This was particularly true for Sigma.

Cross-functional overlapping knowledge. By providing some cross-functional development for its engineers, Alpha had some overlapping knowledge, although less than Beta, which provided cross-functional development to all professional employees. Sigma, which did not employ this practice, had little or almost no overlapping knowledge.

Organization-level processes and project team-level processes

The analysis of the previous sections and the data suggest a "mirror image" of organization-level factors and project-team level factors in a given organization. In organizations that have higher cross-functional communication frequency, a shared sense of cooperation and overlapping knowledge, these patterns are also found on their project teams. In Beta, where cross-functional communication in the daily context of organization was more frequent, team-internal and external communication also appeared to be more frequent, as needed by the project team. Additionally, the shared sense of cooperation and overlapping knowledge found at the organizational level were also found at the project team level. Sigma, which lacked these factors in the larger context of the organization, also lacked them on project teams. Similar patterns were found in Alpha.

Comparing organization-level human resource management practices, project team-level human resource management practices, organization-level processes, project team-level factors, and the capability to mobilize and create knowledge for innovation.

Human resource management practices. The case study analysis suggests that companies use human resource management practices together as a system. Alpha used both organization-level and team-level human resources management practices, Beta used only the organization-level human resources management practices, while Sigma used only the project team-level human resources management practices.

The differences among companies are evident not only in the human resource management practices used, but also in the organization-level and project team-level factors followed, and in the outcomes of the capability. Table 1 presents the results of a comparison of means among firms and measures used.

Organization-level processes. The results show that Beta had the highest level of knowledge mobilization, as indicated by frequency of cross-functional communication, followed by Alpha, and then Sigma. The mean of cross-functional communication frequency for Beta (3.35) is statistically higher than for Alpha (2.12) or Sigma (1.77). The means for the shared sense of cooperation are significantly different between Beta (2.88) and Sigma (0.91) and between Sigma and Alpha (2.08). In addition, the mean overlapping knowledge is also significantly higher for Beta (2.66) than Alpha (1.66) and Sigma (1.27), which means that Beta had the highest capacity for converting individual knowledge into organizational knowledge in terms of innovation.

Project team-level processes. At the project team level, Beta also seemed to have the highest level of knowledge mobilization, as indicated by its team-level internal communication frequency (3.25), followed by Alpha (2.65) and Sigma (2.37), with the differences between Beta and Sigma being statistically significant. For team-external communication frequency and team-level shared sense of cooperation, there are no significant differences among these three companies. There are no differences between Sigma and Alpha. Moreover, Beta also seemed to have a higher capacity for converting individual

knowledge into organizational knowledge, as indicated by the fact that it had the highest level of team-level overlapping knowledge. Beta had a significantly higher level of overlapping knowledge (3.00) than Sigma (1.87) and Alpha (2.12).

The capability to mobilize and create knowledge for innovation. On average, Beta generated more innovations than Sigma per team (1.00 vs. 0.62). This difference, however, is not statistically significant. There are also no significant differences in the number of innovations generated by Beta and Alpha, or between Sigma and Alpha.

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Insert Table 1 about here
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The results of the comparison across companies suggest that companies can use three different strategies in developing the capability to mobilize and create knowledge for innovation. Beta, which only used organization-level human resource management practices, developed its human resources such that the supporting organization-level factors for knowledge mobilization, particularly cross-functional communication frequency, a sense of shared sense of cooperation, and for knowledge creation, overlapping knowledge, were built into the larger context of the organization. I refer to an organization that uses this human resource management system as following the 'organization model' in developing the capability to mobilize and create knowledge for innovation.

Sigma did not develop its human resources at the organizational level such that the supporting organization-level factors for knowledge mobilization and creation were built into the organization, but rather developed its human resources as needed when organized into project teams for innovation. An organization that uses this human resource management system is referred to as following the 'project team model'.

Finally, Alpha developed its human resources using both organization-level human resource management practices and project team-level human resource management practices to achieve the capability to mobilize and create knowledge for innovation. An organization that develops its human resources both at the organizational and project levels is referred to as following the 'mixed model'.

These analyses lead to the proposition that:

Proposition 1: Companies use one of three strategies – organization, project team or mixed– to develop the capability to mobilize and create knowledge for innovation. Companies that follow the organization model develop their human resources such that the organization-level processes that support innovation are generated regardless of when they are used in the process of innovation. Companies that follow the project team model develop their human resources only as they are needed in the process of innovation. Companies that use the mixed model develop their human resources at both levels.

DISCUSSION AND CONCLUSIONS

The comparative case study analysis served to answer the question, How do Japanese and U.S. companies develop the capability to mobilize knowledge and create new resources, particularly innovation? In attempting to answer this question, I put forward a proposition regarding the process by which companies develop this capability. The analysis showed differences in the organization-level and project team-level processes, the human resource management practices, and the efficacy of the organization, project team and mixed strategies in terms of the capability to mobilize and create knowledge for innovation. However, these differences are still not completely clear. Furthermore, the case analysis showed that companies use different strategies to develop the same capability.

These findings are different from what we have seen in the literature. First, we found that in addition to the project team or the organizational model, which are discussed in the team-level innovation literature and organization-level innovation literature, companies may also use the mixed model to develop the same capability. However, unlike previous studies, which argue for a system of practices, this study also shows that the mixed model consists of only certain organizational model practices, and certain project team model practices. Second, contrary to the skepticism that overlapping knowledge exists in U.S. companies located in the United States (Leonard-Barton, 1995), this study also shows that U.S. companies also have some overlapping knowledge, although it is not developed as systematically as is the case in Japanese companies located in Japan (e.g. Westney and Sakakibara, 1986; Leonard-Barton, 1995). Third,

this study shows the mirror image of project team-level processes and their organization-level processes, which previous studies have neglected.

There are three ways in which this study can be expanded: First, the capability to mobilize and create knowledge for innovation is unobservable and can only be measured through its outcomes; although measuring the outcomes in terms of innovation is consistent with the discussions on organizational capability in the resource-based theory of the firm (Prahalad and Hamel, 1990; Kogut and Zander, 1992), such analyses are incomplete. Other outcomes of this capability are also important in understanding the capability. Particularly important are explanations offered by the team-level innovation literature and organization-level innovation literature, such as efficiency in terms of resources used in achieving the innovation (Ancona and Caldwell, 1992b; Clark and Wheelwright, 1992), effectiveness in terms of speed-to-market of the innovation (Clark and Fujimoto, 1991), and customer satisfaction with the innovation (Quinn, 1992). Another significant outcome of this capability is learning, which is the firm's ability to apply the knowledge created in one part of the organization to other relevant parts (Prahalad and Hamel, 1990; Senge, 1990; Nonaka and Takeuchi, 1995).

Second, comparing Japanese companies located in Japan and U.S. companies located in the United States poses some limitations. The institutional environments of the two countries may explain why we see the different practices in these two settings; if this is the case, the transfer of practices across these institutional environments should proceed with caution. As we see in the case of Beta, which is a Japanese company, tremendous investment is made up front in selecting the right people, socializing, evaluating, compensating, training, and developing them regardless of when they organize for innovation. Some researchers (e.g. Milgrom and Roberts, 1992) would argue that Japanese companies can do this because the external labor market is not as developed as in the United States, and therefore, employers can recover these investments.

In contrast, because of the well-developed external labor market in the United States, companies are reluctant to make the same type of investments, since there is a risk that they may not be able to recover them. Therefore, it is argued that there is little economic incentive for companies to undertake these

investments, except perhaps for when they are needed to perform a particular task, e.g., developing an innovation. Moreover, the allocation of human resources in Japanese and U.S. companies located in the United States also differ, perhaps also due to influence from their external labor markets. In the case of Beta, the allocation process of their employees is centralized and controlled by the human resource department, and thus, the movement of employees for development purposes is much more fluid. In contrast, in the United States, the functional departments control the allocation of their human resources, and therefore, the movement of employees is much more difficult. However, in the case of Alpha, we see that cross-functional development of employees is done, but in an ad hoc manner whereby employers, the functional departments receiving employees, and the employees involved have to be willing to undertake this development.

Third, this study can be expanded by controlling for the institutional context using a large sample study, collecting data only on U.S. companies located in the United States. These procedures enable us to expand the case study to determine whether the different capability development models that firms use are associated with higher performance in terms of the capability developed and financial outcome, or profitability.

REFERENCES

Ancona, D., and Caldwell, D. 1992. Demography and design: Predictors of new product team performance. *Organization Science*, 3: 321-341.

Aoki, M. 1988. *Information, incentives, and bargaining in the Japanese economy*. Cambridge: Cambridge University Press.

Barney, J. B. 1991. Firm resources and sustained competitive advantage. *Journal of Management*, 17: 99-120.

Clark, K., and Wheelwright, S. 1992. Organizing and leading "heavyweight" development teams. *California Management Review*, 34:9-28.

Dougherty, D. 1992. Interpretative barriers to successful product innovation in established firms. *Organization Science*, 3: 179-202.

Eisenhardt, K. 1989. Making fast strategic decisions in high-velocity environments. *Academy of Management Journal*. 32: 543-576.

Foss, N. J., Knudsen, C. and Montgomery, C. A. 1995. An Exploration of common ground: integrating evolutionary and strategic theories of the firm. In C. A. Montgomery (Ed.), *Resource-based and evolutionary theories of the firm: towards a synthesis*. Boston, MA: Kluwer Academic Publishers.

Galbraith, K. 1977. *Organization design*. Reading, MA, Addison-Wesley Publishing Company.

Godfrey, P. C., and Hill, C. W. L. 1995. The problem of unobservables in strategic management research. *Strategic Management Journal*, 16: 519-533.

Ichniowski, C., Shaw, K., and Prennushi, G. 1997. The effects of human resource management practices on productivity: A study of steel finishing lines. *American Economic Review*, 87: 291-313.

Katz, R., and Allen, T. 1985. Project performance and the locus of influence in the R&D matrix. *Academy of Management Journal*, 28: 67-87.

Kogut, B., and Zander, U. 1992. Knowledge of the firm, combinative capability and the replication of technology. *Organization Science*, 3: 383-97.

Lawrence, P. R., and Lorsch, J. W. 1967. *Organization and environment: Managing differentiation and integration*. Boston, MA: Division of Research, Graduate School of Business Administration, Harvard University.

Leonard-Barton, D. 1995. *Wellsprings of knowledge*. Boston, MA: Harvard Business School Press.

Nohria, N., and Ghoshal, S. 1997. *The differentiated network*. San Francisco, CA: Jossey-Bass Publishers.

Nonaka, I., and Takeuchi, H. 1995. *The knowledge-creating company: How Japanese create the dynamics of innovation*. Oxford, UK: Oxford University Press.

Penrose, E. 1959. *The theory of the growth of the firm*. New York, NY: John Wiley.

Prahalad, C. K., and Hamel, G. 1990. The core competence of the corporation. *Harvard Business Review* (May-June): 79-91.

Roth, G. L., and Kleiner, A. 1996. *The Learning initiative at the Auto Company Epsilon Program*. Working paper 18.005, Organizational Learning Center, Massachusetts Institute of Technology, Cambridge, MA.

Teece, D. J., Pisano, G., and Shuen, A. 1997. Dynamic capabilities and strategic management. *Strategic Management Journal*, 7: 509-533.

Wageman, R. 1995. Interdependence and group effectiveness. *Administrative Science Quarterly*, 40: 145-180.

Westney, D. E., and Sakakibara, K. 1986. Designing the designers: Computer R&D in the United States and Japan. *Technology Review*, 89(3): 24-31.

Yin, R. 1984. *Case study research: Design and methods*. Beverly Hills, Calif.: Sage Publications.

FIGURE 1

Framework of the development of the capability to mobilize and create knowledge for innovation

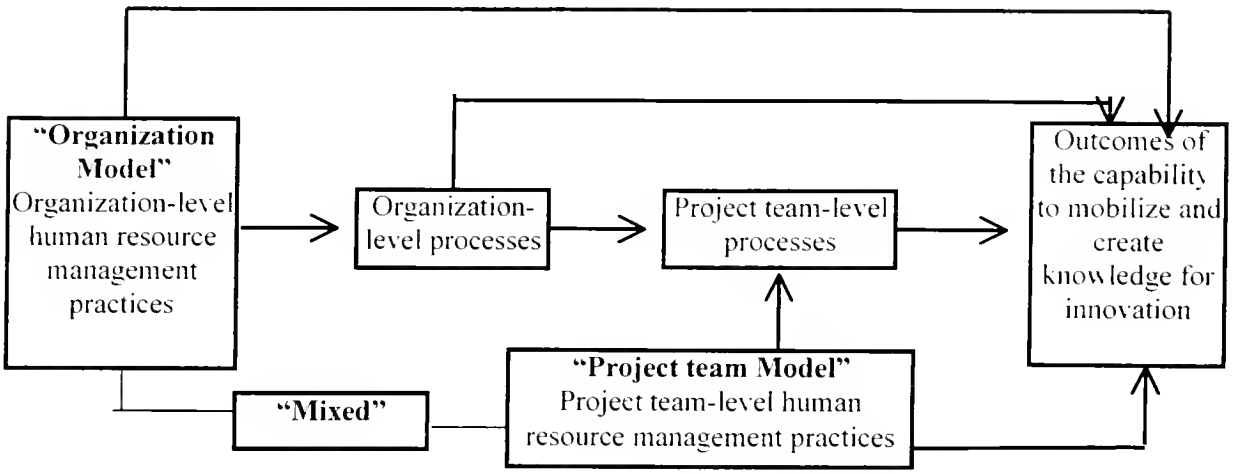

TABLE 1

Comparative analysis of organization-level processes, project team-level processes and outcome of the capability to mobilize and create knowledge for innovation

			Firm			T-tests			Tamhane's T2 Test
			Alpha (N = 35)	Beta (N = 44)	Sigma (N = 32)	Alpha vs Beta	Alpha vs Sigma	Beta vs Sigma	Alpha vs Beta vs Sigma
Organization-level processes		***Measures***							
Facilitators of knowledge mobilization	Organization-level cross-functional communication Frequency	Cross-functional face-to-face communication frequency	2.12 (0.27)	3.35 (1.08)	1.77 (0.24)	*	*	**	*
	Shared sense of cooperation	Shared commitment across functions toward achieving organizational goal	2.08 (0.16)	2.88 (0.49)	0.91 (0.39)	†	**	***	*
Facilitator of knowledge creation	Overlapping knowledge	Total cross-functional on-the-job training, job rotation of engineers, for each equals 1	1.66 (0.43)	2.66 (1.03)	1.27 (0.18)	***		***	
Project team level processes									
Facilitators of knowledge mobilization	Internal communication	Communication frequency among core team members using face-to-face meetings	2.62 (0.74)	3.25 (0.70)	2.37 (0.74)			*	
	External communication	Communication frequency between team members and their external links using face-to-face meetings	2.12 (0.83)	2.25 (0.70)	2.00 (0.53)				
	Shared sense of cooperation	Shared commitment among team members	2.62 (0.51)	3.25 (0.70)	2.62 (1.06)	†			
Facilitator of knowledge creation	Overlapping knowledge	Overlapping knowledge among engineering team members, each overlapping equals 1; otherwise 0	2.12 (0.83)	3.00 (0.53)	1.87 (0.99)	*		*	
Capability									
	Avg number of Innovation/ Team	Project team resulted in new product development, product modification, or process innovation (average to company level), yes = 1	0.75 (0.46)	1.00 (0.00)	0.62 (0.51)			†	

Standard deviation appears in parentheses. Significance: ***0.001, **0.01, *0.05, † 0.1